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REPORT ON COLUMBIA RIVER POWER PROJECT NEAR THE DALLES, OREGON.

BY L. F. HARZA.

THE APPLICATION OF THE RULES OF BUSINESS TO THE SCIENCE OF GOVERNMENT

BY A. B. CASS.

ELECTRICAL PROSPERITY WEEK PLANS FOR THE PACIFIC COAST

PROGRAM OF LEGISLATION RELATIVE TO CALIFORNIA GROUND WATERS

BY CHARLES H. LEE.

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Alphabetical Index to Advertisers, Page 8 Where to Buy It in the West, Page 9

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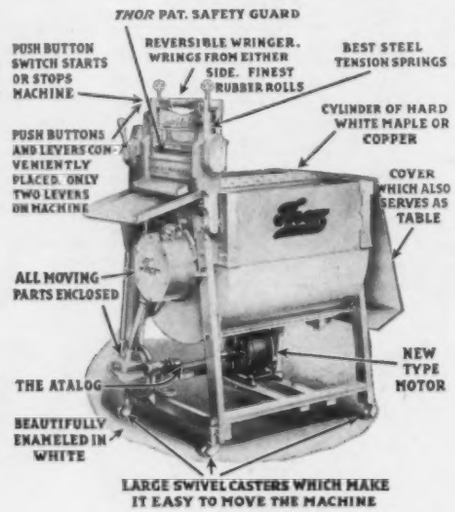
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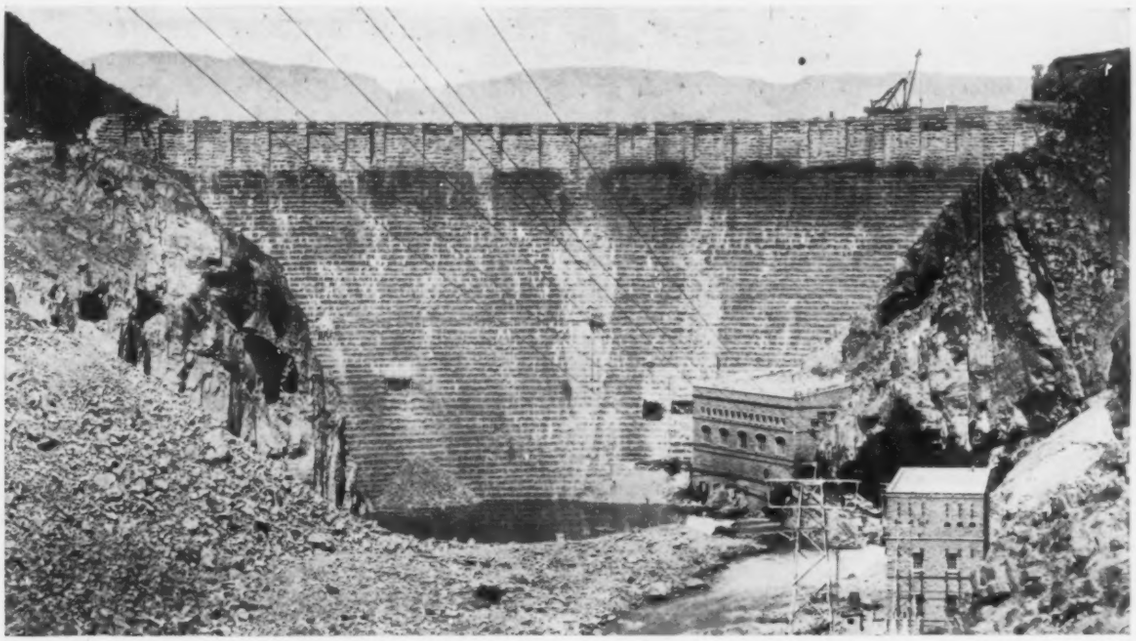
REPORT ON COLUMBIA RIVER POWER PROJECT

NEAR THE DALLES, OREGON

BY L. F. HARZA

(Continued.)

The accompanying views show projects built by the U. S. Reclamation Service, including the Roosevelt dam, power house and transformer house on the Salt River Project in Arizona, the Lahonton power house of the Truckee-Carson Project, Nevada, and the Minidoka hydroelectric station in Idaho. These projects are all much smaller than the proposed one, but indicate types of structures and conditions in some respects comparable.



Roosevelt Dam, Power House and Transformer Station for Salt River Project.

The combined capacity of all the indivdual stations thus far built at Niagara Falls would approximately equal the capacity of the proposed station. Although the total possible capacity at Niagara greatly exceeds that of the Columbia at this place, yet the amount which can be developed is limited, to preserve the beauty of the falls, by international treaty, and has been practically reached.

Damage to agricultural lands. The damage to agricultural interests due to overflow from the proposed dam would be small in comparison with the size of the project. The bottom land throughout most of the 25 miles or more of back water influence consists largely of bare lava rock and shifting sand dunes. There are a few areas which have been reclaimed by irrigation and are highly cultivated, notably at and near the mouth of the Deschutes River and at Maryhill, Washington. Most of these lands would not be injured except during occasional high water years. All lands which would be injured by the project are already subject to overflow, since it is not proposed that future high floods shall exceed those of the past. They would, however, be overflowed more frequently than now, especially areas lying in elevation at or below the elevation of the backwater curve for 800,000 second feet. The estimate includes the entire value of all lands which fall below the elevation, at the property considered, of the higher of the two backwater curves for a controlled flow of 800,000 second feet or for the natural profile for 950,000 second feet as shown in Appendix "D," since some increase above normal water level is anticipated for all floods up to the latter limit.

Minidoka Power Plant in Idaho.

Damage to salmon fisheries. There are on the Oregon side, at Celilo, three fish-wheels and a small cannery in a very bad state of repair, owned by I. H. Taffe. These would be rendered useless by the proposed development. There are two fish-wheels, one on either side at Ten Mile Rapids, both owned or operated by Seufert Brothers & Company, which would also be rendered useless. At the damsite on the Oregon side are two fish-wheels which would need to be destroyed for the construction of the dam. One is a large and expensive wheel as also a productive one. The other is at a high elevation and is of little value except at intervals of several years when the water rises high enough to operate it. Both are owned by Seufert Brothers & Company.

There are in addition to these, six other fish-wheels owned by the same company, three on either side along the shore of Five Mile Rapids. They would not be destroyed by the development and their season would be little if any affected as they are all at a considerable distance above low water level and there would always be water wasting through the dam and furnishing a strong current through the rapids at all times when the stage of the river would otherwise be high enough to operate them. In addition to this it may be confidently predicted that the density of fish in the river and the catch would be greatly increased because of the obstruction furnished by the dam.

A large fish ladder would be provided along the power house wall as described in Appendix "H" which would assist to keep the upper river stocked with fish.

Revision of railroads. The changes needed in the railroads to permit operation under the proposed program of head control are indicated by the profiles shown in Fig. 5. (See p.—, Nov.—. The O.-W. R. & N. requires raising through a great part of the distance from the damsite to Squally Hook. This revised profile is based upon clearing by safe margin the higher of the two profiles of the 800,000 second feet controlled backwater curve or the 950,000 second feet natural profile as shown in Fig. 5. It is really unnecessary to assess this entire damage to the project as some damage would result to the railroads even under present conditions from floods of the same magnitude. The entire revision is included in the estimate, however, to serve as a contingent fund to cover the many legal difficulties which arise in adjusting damages of any sort.

The Spokane, Portland & Seattle Railroad would require reconstruction to place it above the elevation of water in the adjacent canal. The revised profile is shown also in Fig. 5. It is proposed to maintain a subgrade elevation of 157.0 ft. from above the damsite to the power house and then drop down on a grade of 0.2 per cent compensated 0.04 per cent for curvature, which is the present physical standard, until the present subgrade elevation is again reached at Granddalles, about 4 miles below.

Relation to navigation. The Dalles-Celilo Navigation Canal now being built by appropriation from Congress by the Corps of Engineers, U. S. A., is nearing completion and will be in service early in the summer of 1915. The lower terminal is at Big Eddy, the present head of navigation. The upper terminal is at Celilo, 8.5 miles above.

The controlled high and low water profiles in this canal and the canal bank, as also the limit of navigation, are shown in Fig. 5, where it will be seen that the proposed elevation of headwater, 151.0, would submerge this canal from the damsite upward to Celilo. It would also create slack water as far as Squally Hook Rapids, thus absorbing several swift places where navigation is not now ideal.

In the length of the canal are five locks; two at Big Eddy known as "Tandem Locks," one at the damsite known as "Five Mile Lock," one at Ten Mile Rapids and one at Celilo. The two last mentioned would be submerged and Five Mile Lock would require reconstruction, while Tandem Locks would be unaffected. After construction of the project boats would enter and leave the main river at Five Mile Lock, being required to use the canal for only one and one-half miles.

Other interests affected. On the Washington side at the damsite is the Indian village of Wishram. The tract upon which this village is located is partly Indian property allotted by treaty, but all on the river side of the S. P. & S. Railroad, which would be chiefly affected, belongs to Seufert Bros. & Company, as does nearly the entire area needed for the power canal.

At the mouth of the Deschutes River is a power site offering an available head of 35 feet with a flow of 5000 second feet or a net continuous capacity of about 15,000 horsepower, except during high water in the Columbia, when the head would be considerably reduced by backwater from this source. After con-

Interior of Minidoka Power House.

Lahonton Power House of Truckee-Carson Project in Nevada.

struction of the proposed project this head would be reduced more often and in greater amount and the value of the power depreciated. The estimated total undeveloped value of the power site has been included in the cost of the project.

Estimate of capital cost. The estimated total capital cost of the development as shown by the summary in Appendix "I" is $50,000,000. This includes a margin above estimated actual construction costs of 25 per cent for engineering, management during construction, and contingencies; it also includes 10 per cent for interest during construction. The assumed unit prices are discussed in detail in Appendix "I."

This capital cost amounts to about the following: $104 per horsepower of continuous primary delivery capacity (480,000 horsepower); $62.50 per horsepower of total salable power, including surplus available at least 8 months per year (800,000 horsepower); $46.30 per horsepower of total generating capacity (1,080,000 horsepower) as indicated by normal rating of generators, but which maximum power is available only about 4 months during the average year as shown by Fig. 26 and therefore of no commercial value.

In judging the cost of this project as compared with others it should be remembered that the usual basis for expressing the capacity of a generating station is the third one above used, as for example in the case of the rating of the Keokuk station at 300,000 h.p. It is not the logical basis, however, since, because of differences in hydraulic and load conditions it is not proportional to income, and comparison of stated capital costs are for this reason of little significance. The above costs are relatively low when compared with most constructed projects on the same basis of rating.

The minimum practicable selling price for power at the generating station and at generated voltage is estimated at $9.02 per horsepower-year of peak demand if the plant is financed by 3 per cent securities sold at par, or similarly at $10.35 per horsepower with 4 per cent securities, or at $15.15 with 6 per cent securities sold at 10 per cent discount. The above estimates are based on the assumption that only the primary output of 480,000 h.p. is thus sold, and that it is marketed at the moment the station is ready to operate at its capacity, without profit other than might inure through the margin allowed for operating contingencies.

If, however, the surplus power of 320,000 h.p. could be sold at rates equivalent to 80 per cent of the value of the continuous or primary power, for eleven months' service, 60 per cent for ten months' service and 30 per cent for eight months' service, then the selling prices of primary power under conditions as above would be reduced to $6.63 per horsepower-year for 3 per cent securities, $7.58 for 4 per cent securities and $11.02 for 6 per cent securities discounted 10 per cent.

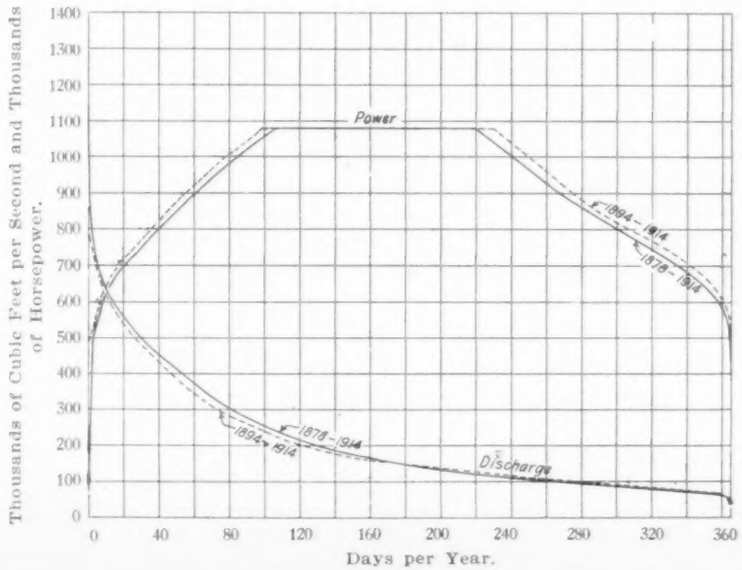


Fig. 26. Mean Annual Duration Curves of Discharge and Corresponding Power.

If it be further assumed that the station start operation with only one-tenth of the output marketed, and that the load be thereafter built up uniformly until it is all sold at the expiration of ten years, then the capital costs would be increased by the accumulated deficits of the early years to totals of $61,000,000 for 3 per cent securities, $63,000,000 for 4 per cent securities and $78,000,000 (face value of bonds) for 6 per cent interest on bonds originally sold at 10 per cent discount.

The annual costs of service on this basis, comparable with those above mentioned, would be for power marketed at the outset, $9.85 for 3 per cent securities, $11.65 for 4 per cent securities and $18.75 for 6 per cent discounted securities, per horsepower per annum of peak demand. With both primary and surplus outputs marketed at relative prices before mentioned, the corresponding prices of primary power under these conditions of a ten-year period of developing markets, would be $7.25 with 3 per cent securities, $8.55 with 4 per cent securities and $13.70 for 6 per cent discounted securities.

The above prices all include a margin of 25 per cent above estimated actual cost of generation as a contingent allowance.

If the charge for power were thus made on the basis of peak demand, the actual cost of energy to consumers would necessarily be greatly affected by the individual load factor. Thus a consumer serving a general load, such for example as the power companies now operating in the Portland district, would have a load factor of approximately 50 per cent, and the cost of energy based on unit prices for actual use would consequently be twice the above prices which are based on peak demand or 100 per cent load factor. Only a small allowance, if any, could be made from the peak rate for these low load factors as no appreciable storage exists which would permit the flow during light loads to be held for use during peak hours.

No attempt has been made to estimate the cost of serving a distant customer requiring transformation and high tension transmission, as such costs would be so largely dependent upon assumptions as to location, character of load, possibility of grouping of consumers to reduce distribution costs, etc., that each case would need to be considered individually. It is sufficient to say that distribution to distant large consumers would add greatly to the cost of power, and to distribute to small consumers in a sparsely settled territory would so increase the cost as to eliminate to a considerable degree the advantage of cheap generation, since for small consumers the cost of distribution is usually the controlling consideration, often far outweighing the former in determining the total cost of service.

(To be continued.)

Waterfall electricity is the name given to electrical phenomena accompanying waterfalls, splashing brooks, rain and in other cases where the water becomes positively electrified and the negative charge passes into the air. An electrified double layer exists on the liquid surface, which is separated into a positive and negative change. The cause of this double layer lies in the electrical nature of the molecular forces. This theory is used to explain thunderstorms.

THE APPLICATION OF THE RULES OF BUSINESS TO THE SCIENCE OF GOVERNMENT.

BY A. B. CASS.

(This strong address regarding the civic duty of every electrical man, was delivered before the Jovian Electrical League of Southern California on Nov. 10, 1915. The author is president of the Home Telephone Co. of Los Angeles.—The Editor)

There rests upon you, individually and collectively, a very great responsibility, both as representatives of corporations, firms, or individuals, and as citizens of our great commonwealth, who wish to perpetuate the institutions handed down to us by our forefathers, who so carefully builded the bulwarks of liberty, behind which we are now entrenched.

It is not necessary to tell you that there is abroad today a spirit of carping criticism of everything that tends toward success. This spirit doubtless had its birth and inception in the hearts of those, who, lacking in capacity or energy, or both, and constantly falling behind in the struggle for advancement through progress and invention, became filled with jealousy at the success achieved by those who, with a keener grasp upon the situation, were enabled, perhaps through many failures, to securely lay the foundation for fame and fortune upon the broad plane of human betterment. This spirit of criticism has gradually crept from individuals into groups, and from groups into political parties, and through political parties and individuals into legislative halls, both state and national, where it has been given expression in much harmful legislation, so restrictive in character as to seriously impede the onward march of civilization.

Any well-meaning citizen should not only welcome, but should co-operate in the formation and passage of laws which in their character and operation, are equitable and humanitarian. But unfortunately the legislation which has been so shamefully aimed at the successful business man is neither equitable, humanitarian, or even intelligent. One of the deplorable results following this kind of legislation is the fact that there are today more miles of railroads in receivers' hands than ever before in the history of our country. The railroads are in that unenviable position of being required by law to perform the duties of common carriers, but without power to so adjust their rates as to furnish them the required revenues to enable them to do so. On the other hand the government has assumed the right to regulate, which usually means to lower rates without accepting responsibility for the losses which may follow.

Our great need today as a state and as a nation, is that men like you, having a close relationship with the many problems confronting the business enterprises of our country, should bring to bear upon those problems your keenest intellect. You owe it to society, you owe it to your employer and to your business associates, and you owe it to yourselves to bring all the analytical powers of your minds to bear upon the political problems confronting us. You owe it to every relationship of your life to keep constantly in mind the importance of studying the methods of those who seek to destroy the enterprises you are trying to erect, those who endeavor through political chicanery to neutralize your effort along legitimate lines of progress. Meet them upon their own ground political,

or otherwise, and in every way contest with them each inch of the ground over which they are now striving to destroy that which you are endeavoring to build up.

It is a matter of great regret that an intelligent consideration of the real needs of our people cannot be the impelling motive for constructive legislation that will aid and not destroy legitimate business. It is to be regretted that in one of the great nations of Europe, contesting today for supremacy, there exists a striking illustration of how the vitality of a nation may become stupified through the indolence and inactivity of those who should naturally have taken the lead in shaping the future of a great people; those who, having eyes, see not that the forces of error and evil were slowly but surely sapping the patriotic impulses of the nation, until a great crisis laid bare the depths of the abyss on whose brink they were standing.

It is of the greatest importance to our social, industrial and commercial fabric, that the men whom we send to the legislative halls to represent us and to make laws under which we and our institutions must live and thrive, if they are to thrive, should be men not tainted with this germ and disorder of antagonism to the proper and economic development of the vital forces of our nation. We should not wait until we have left only a choice between two candidates, which may be but a choice between two evils; but we should lend active and energetic aid in inducing men of force and fitness to enter the political arena, that the country's problems may be fairly considered. Too long have we been indifferent to the importance of sending men of mature thought and intellectual capacity to formulate the rules under which the game of life must be played; too long have we failed to realize the importance of the application of the proper rules of economics to our every day life and relationships; too long have we depended upon a low grade of apprentices working without knowledge of either tools or material to build this social and industrial fabric, which should have been planned and builded by well skilled minds and hands; too long have we unthinkingly voted for Bill, Jim, or Tom, because he was a good fellow, regardless of the fact that he knew nothing of, nor had the mentality to grasp any of the intricate problems he was expected to solve; men who are willing to ride in the band wagon with muck rakers. If your employers selected their employes with the same lack of intelligence as you and I have selected our political employes, the business of which you are now a part, would long since have fallen into a useless heap of ruins, just as our governmental fabric is today actually threatening to fall about our heads, because of our lack of intelligence; because of our failure to apply to the selection of our political and governmental employes the same rule of required knowledge and intelligence that is applied today by the men who direct the affairs of the organizations to which you are related. What right have you and I, to expect that while we are devoting our time and thought to matters wholly pertaining to business, some intangible force working without any assistance from us, is going to carry on in our best interest the affairs of state? Is it so in other affairs of life? Suppose we turn the situation around, and devote all of our time and thought to purely political matters, how long would it be before our business affairs would be past any possibility of help? The answer is plain as day.

Now the science of government is just as susceptible to intelligent development as is the business in which you and I are engaged, and our common country has just as much right to expect every citizen to contribute his thought to the proper solution of her problems as to pay his taxes for her maintenance, and if the rules of business are good for the development of business, why not apply them to the matter of government. Let us get down out of the clouds of speculative theories and realize that the laws of economics are as real as the law of gravity, and that unless we observe such laws, we are sure to strike upon the rocks lying in the paths of those who disregard the signs indicating the proper course.

Gentlemen, the future is before us with all of its possibilities in this best of all countries. Shall we continue to go on in the blind blundering way in which we have gone in the past, or shall we apply to the vital things of life some measure of the intelligence that God has given us, in the solution of some of the problems that are daily coming to us all? The responsibility rests with ourselves—will we arise to the occasion?

LETTER TO THE EDITOR.

Power in Farming.

Sir: I was very much interested in your editorial in the number of October 23rd on "Power in Farming," and particularly the last portion, wherein you refer to the question of electric tractors and electric plows.

In the main it would be an easy matter to design a tractor meeting the requirements of electric plowing. As you, no doubt, will recall from the work that I did on this matter some months ago, the chief factor that stands in the way of an electric tractor is the inadequate supply of electric energy; that is, the yearly consumption of such a machine is not quite sufficient to make it a paying proposition for the power companies to extend their lines.

It will come eventually, but it can only come through a friendly attitude of the power companies, and at the present time such an attitude is not exhibited.

That has been one of the chief features in the development of the gas tractor. It is built to make individual demonstrations; it is built to be placed anywhere, without reference to other industrial enterprises. And instead of coming in through the front door, it came in the back way, and quickly occupied the whole house. The electric power line usually leads to the front door, and until the electric tractor comes in with a card of introduction from the power company its chance of development is comparatively small.

However, your editorial is of interest and contains much food for thought, and, no doubt, some day the chasm between cost of making connection and power consumption per square mile will be bridged.

Very truly yours,

J. W. SWAREN.

San Francisco, Nov. 17, 1915.

HOW TO PERPETUATE ELECTRICAL PROSPERITY.

Continued prosperity can only be attained by having those who are responsible for our country's prosperity working together. Our lapses in prosperity are caused by lack of co-operation. Honest and unceasing co-operation surely brings perpetual prosperity. As for the mistakes of our kindred branches, it is not for me to sit in judgment. I might however hazard the opinion that the great mistake of the consumer is his failure to make more common use of the thousand and one articles operated by that most wonderful of nature's forces—electricity.

C. E. WIGGIN.

In inviting opinions on the question of how best to perpetuate prosperity, the Journal editors have undoubtedly aided materially in the solution of the very question they propound.

The perpetuation of prosperity, like prosperity itself, is psychological. To make a thing real, we need only think it, talk it, and act it until it takes real form.

The next logical step to the celebration of Electrical Prosperity Week is to work for the perpetuation of that prosperity and see it in all its fullness. This discussion, exchange of ideas and expressions of opinion will lead us to think and talk about perpetuating prosperity, and consequently in a proportionate degree, to act and influence others to act toward the desired end.

The central stations, under pressure of the electrical industry on one side, and the people, through the commissions, on the other side; but chiefly on account of a growing realization of what is just toward others, are rapidly eliminating their mistakes of the past. The manufacturer, likewise, is taking long strides in the same direction; having come to know that service satisfies customers and at the same time nets larger returns. The jobbers and the contractors —the "trade," so to speak—have probably been the slowest to correct their mistakes. Some jobbers appear to cling to the old order of unwise antagonism toward new things, losing sight of the fact that these new developments spell progress. The contractors to a certain extent continue to allow themselves to be drawn into useless strife. They could meanwhile be concerning themselves with their own affairs, and do a profitable business on a basis of quality and service at fair prices. The undesirable competitor would work out his own destiny as quickly and as completely as anybody could do it for him.

The consumer is the ultimate beneficiary of the work of all the others before mentioned. His greatest mistake has probably been the sacrificing of quality for cheapness, but thanks to the excellent publicity and educational work of the various electrical organizations, this mistake is also being rapidly eliminated.

H. F. HARTZELL.

Electrical Prosperity Week should serve the purpose of inspiring confidence, both in Electricity and Prosperity. Electricity is material and its discovery and aplication mark the greatest advance which man has made in controlling the forces of nature. Prosperity is psychological—the attitude of the mind of man towards the world about him. When electricity shall have come into its own as the great servant of man, prosperity will not be for a week, but for all time. Emerson suggested something about hitching your wagon to a star. Edison and others have made it possible to hitch the wagon of man to a streak of lightning so that his burdens might be carried and his work done.

Everyone in the chain by which electrical supplies get from the original producer to the ultimate consumer fails in his duty, if he does nothing to hasten the time when electricity shall perform the work of the world.

Let "Prosperity Week" then be heralded with the slogan "Make Electricity the Real Servant of Man," and for one week at least let us think, talk and act electrically.

ALBERT H. ELLIOT.

There can be to my mind no more eloquent reply to the question, "How best can we perpetuate prosperity?" than the marvelous, unparalleled co-operative movement between a great industry and the people, about to be launched, and to be known throughout the land as Electrical Prosperity Week. It is a most stupendous challenge to the pessimist, a gloom dispeller of the most impressive magnitude, immeasurable in its scope by anything previously attempted in industrial history.

It will force upon the minds of one hundred million souls, by a week of country wide brilliancy, the positive conviction that the infant prodigy, electricity, has grown so rapidly that it can now safely, clearly, efficiently and economically eliminate nearly all human toil. That the industry, without counting electric railways, etc., represents investments of more than $3,000,000,000, enough to build seven Panama Canals or feed all the men and horses in the European war for eight years. That last year the industry did a business of $2,265,000,000. That day by day electricity is bettering life in all its complexities, reducing toil, raising men and women to a higher sphere and making the world a brighter, more joyous and a happier abode for mankind.

It is to be a celebration instituted to create a stronger spirit of confidence in the stability of the nation and its resources, to promote better business and more sales of electricity and electrical products. It was named "Electrical Prosperity Week" because electricity and progress go hand in hand.

It will, furthermore, stimulate an even closer bond of co-operative effort between the various interests composing this stupendous industry, namely those manufacturing, selling and installing electrical products, those generating and distributing the current for their operation and the people themselves, who by the purchase and utilization of these commodities in their everyday lives will bring prosperity to the industry only in such measure, as the close and efficient co-operation between its various component parts might merit.

It is an axiomatic fact, however, that in order to insure perpetuity, whether it be of prosperity, an ideal or an industrial reality, it must primarily be firmly established upon honorable and unshakeable principles and facts. We must believe in it, preach it, practice it, demonstrate it, feed it, live it, day by day, for only in this manner can its germs of confidence, co-operation and cheer create new courage, and compel the optimism and faith in the nation's future upon which rests the healthy well-being of our nation, its institutions and its men and women.

In conclusion let me say, that in my judgment, no more effective sermon on prosperity has ever been preached—no movement has ever had a firmer foundation on which to base so powerful an appeal for optimism as Electrical Prosperity Week, whose very initials spell Efficiency, Plenty and Wealth, backed by Energy, Power and Work.

THEO. E. BURGER.

PLANS FOR PACIFIC COAST PARTICIPATION IN ELECTRICAL PROSPERITY WEEK.

All electrical interests on the Pacific Coast have identified themselves with the national drive of Electrical Prosperity Week. Tons of literature have been sent from the New York office of the Society of Electrical Development and local committees have been actively at work during the past month at Spokane, Seattle, Portland, San Francisco, Los Angeles, Tucson and other cities arranging for an effective local tie-in with this nation-wide movement.

It is yet too soon to tell the whole story of how the Pacific Coast plans to profit by participation, but a good idea may be gained from the following accounts of what is being done at Portland, San Francisco and Los Angeles.

Portland Plans.

Portland will wear an air of brilliant festivity during Electrical Prosperity Week. The retail merchants bureau of the Chamber of Commerce will complete its holiday decorations of the business section of the city by November 29th. Eight miles of cedar garlands stretching from pole to pole with two eight-foot Christmas trees at each post, will be a reminder of electrical prosperity by day and at night festoons of lights at every street intersection, will blazon forth optimism. These decorations will be maintained until New Year's day. The bridges across the river will also be illuminated during this period.

A special illuminating display has been arranged on the top of the Pittock Building where a steam curtain will be shown, illuminated from the rear by a search light. The steam curtain will be supplied with steam from the steam plant of the Northwestern Electric Company in the basement of the Pittock Building.

In addition to a circular letter sent out by the Retail Merchants' Bureau to the Portland firms, the Portland Electrical Prosperity Week Committee has sent out a similar letter to about twenty central station managers throughout Oregon, requesting their co-operation and offering to supply them with a portion of the printed matter in the form of window lithographs, window cards, poster stamps, etc., which has been supplied to the Portland Committee by the Society for Electrical Development, and the committee has also offered to assist the central stations in other parts of Oregon in any way they can in the development of a display or other publicity for "Electrical Prosperity Week" in each of the various Oregon towns.

Arrangements have been made to offer prizes to the Portland school children for the best paper on the use of electrical appliances, etc.

Arrangements are also being made to combine the advertising of the various electrical interests in Portland and make up an electrical page in each of the various Portland newspapers, this page to consist of advertising matter and also of a certain amount of news matter on the subject of electrical development and "Electrical Prosperity Week."

It is also being arranged to have speakers appear before the various business clubs and booster clubs in Portland during their luncheon meetings or other meetings and present the aims and object of "Electrical Prosperity Week," and ask for the co-operation of the respective clubs.

The plants of the various operating companies in Portland will open for public inspection during "Electrical Prosperity Week." This will include not only the light and power companies but also the telephone companies. Mr. Spoeri of the Pacific Telephone & Telegraph Company is arranging to have an exhibit of Bell telephone operation in one of the prominent down-town windows.

Arrangements will also be made to show slides in the local moving picture theaters advertising "Electrical Prosperity Week."

Approximately 500 cards are to be placed in the street cars of Portland advertising "Prosperity Week," also 300 cards put on the dash boards of the Portland cars. Sixty large billboard posters as furnished by the Society for Electrical Development have been placed on prominent billboards throughout Portland.

Referring again to the circular letter sent out to the Portland merchants by the Retail Merchants' Bureau of the Chamber of Commerce, the Electrical Prosperity Week Committee, together with the committee appointed by the Retail Merchants' Bureau, is arranging to follow up by personal calls each of these letters and to see that every merchant is supplied with a quantity of "Prosperity Week" poster stamps, window cards, window lithographs and any other literature that they can use, and also to do what they can to assist them in working up an attractive window display.

One of the prominent features of the Portland program will be an electrical parade, probably on

Monday night, November 29th, although this date has not as yet been definitely settled. Mr. Will Spalding will be in charge of this feature of the program, and there is every indication that this parade will be a distinct success. It will consist of course, of only electric vehicles.

The three large department stores in Portland, Meier & Frank Company, Olds, Wortman & King, and Lipman, Wolfe & Company have agreed to display on their delivery wagons, banners advertising "Electrical Prosperity Week." Banners will also be shown on the wagons of the Portland Railway, Light & Power Company and the Northwestern Electric Company. This will make about 250 banners in circulation on the streets of Portland during "Electrical Prosperity Week" and the week immediately preceding.

A number of large banners made up from the bill posters furnished by the Society for Electrical Development, these banners being about 7 ft. by 9 ft., have been hung in prominent places throughout the city. Two of them have been put in the rooms of the Chamber of Commerce, another has been put in the United States National Bank, another in the electric store of the Electric Building, another in the offices of the Northwestern Electric Company, and others are being placed in some of the large store windows.

It is also being planned to offer prizes for the best decorated window showing electrical appliances, and also for the best lighting effect.

Beginning with the day after Thanksgiving Day, the larger department stores in town have agreed to put the "Electrical Prosperity Week" poster stamp on every package delivered by them. This will continue from November 26th on through "Electrical Prosperity Week" and it is estimated that between 50,000 and 75,000 poster stamps will be put in circulation in this manner alone.

A Prosperity Parade is in contemplation, but the details have not as yet been worked out, and this feature is still in a rather tentative form. Other features will probably be worked up between now and "Electrical Prosperity Week," as the entire matter is still in a somewhat formative stage.

The Portland committee consists of the following: O. B. Coldwell, general superintendent Portland Railway, Light & Power Company, chairman; Fred Spoeri, manager of the Pacific Telephone & Telegraph Company; W. P. Strandborg of the Portland Railway, Light & Power Company; A. C. McMicken of the Portland Railway, Light & Power Company; J. A. Cranston, local manager of the General Electric Company; A. S. Moody, assistant manager of the General Electric Company; J. E. Davidson, vice-president and general manager of the Pacific Power & Light Company; C. E. Wernicke, local manager of the Westinghouse Electric & Manufacturing Company; F. N. Averill, manager of the Fobes Supply Company; F. C. Green of the E. L. Knight & Company; G. A. Boring of the Pacific States Electric Company; W. H. P. Hill of the Northwestern Electric Company; J. R. Tomlinson of the Pierce-Tomlinson Company; Stacy Hamilton, secretary Electrical Prosperity Week Committee.

Arrangements at San Francisco.

From San Francisco as a center the whole of Central California has been electrified with the spirit of optimism. "Electrical Prosperity" is being carried into every home and business throughout this great region by means of poster stamps on all the bills and receipts mailed by the Pacific Telephone & Telegraph Company, the Pacific Gas & Electric Company, the Great Western Power Company, Sierra & San Francisco Power Company, and the Northern California Power Company. The power companies, furthermore, used the booklets supplied by the Society for Electrical Development as envelope stuffers in a great part of their outgoing mail.

The San Francisco committee has supplied 193 electrical dealers in 66 towns with window posters, automobile signs, window cards, pamphlets and poster stamps furnished by the Society for Electrical Development. Most of these dealers have been visited in person and given suggestions as to using this material to the best advantages. Prizes have been offered, also, for the best window displays.

On Monday morning, November 29th, the opening gun of the campaign at San Francisco will be fired in the form of full page advertisements in the daily papers. Arrangements have been completed for similar pages in other towns.

An electrical show is to be conducted from December 2 to December 21 by the Alameda county contractors in Oakland's big municipal auditorium as a part of the Oakland Women's Household Show. Prizes have been provided for the school children writing the best essay on "What I Saw at the Electric Show."

Lectures and demonstrations on electricity are to be given in the high schools during the week. Electrical men will speak before the various organizations holding midday lunches, such as the Rotary Club, the Advertising Club and the Home Industry League. Elaborate programs have been arranged in each case.

On Wednesday night a great "Prosperity Ball" will be held at the San Francisco Civic Auditorium. The Electrical Prosperity Week Committee are decorating the two central boxes with electric signs and festoons of colored lights. The signs will blazon forth the slogan "do it electrically," "an electric appliance is a useful gift" and "shop early." The queen of the ball, the typical California girl as selected after a state-wide quest, will be crowned with an electrical crown on an electric throne, which is a reproduction of the Electrical Prosperity Week poster design used so extensively throughout the country. While the queen is not occupying the throne, the goddess Electra will be there, operating an electric switch which will control the brilliant electric display. With Novagems as her jewels and with the words "power, heat, light" outlined in electricity. this will be the most spectacular feature of the ball, as it brings to life the emblem of Electrical Prosperity Week.

On Saturday night a tremendous electric parade and pageant will signalize the closing of the Panama-Pacific International Exposition and the dawning of a new era of prosperity, the volt age. Entries have already been made for a parade over ten thousand feet in length. The San Francisco Section of the Electric

Vehicle Association were instrumental in entering many electric vehicles and pleasure cars. Every entry will be brightly lighted and many novel and startling floats are in process of preparation.

This stupendous local campaign of publicity for electricity has been carried on under the direction of a general committee appointed by the Society for Electrical Development co-operating with a committee of the Electrical Development and Jovian League. The general committee consists of John A. Britton (chairman), Dr. Thomas Addison, T. E. Bibbins, W. W. Briggs, W. S. Hanbridge, C. E. Heise, G. C. Holberton and F. H. Leggett. The Electrical Development and Jovian League committee consists of C. C. Hillis (chairman), N. M. Hope, G. A. Koch, W. D. Kohlwey, A. E. Rowe and G. A. Sittman.

The committee on the electrical decoration of the Civic Auditorium for the Prosperity Ball, on Wednesday, consists of T. W. Simpson (chairman), G. A. Koch and G. A. Sittman. Those having in charge the arrangements for the electrical parade at the Panama-Pacific International Exposition on the last night are: A. E. Rowe (chairman), T. Collins, C. W. Hutton, A. Morbio, S. V. Walton and G. F. Wakeman. The campaign manager for the week is A. H. Halloran.

The Los Angeles Campaign.

The local plans for Prosperity Week include among other activities the decoration of windows in downtown district; decoration of electric cars with muslin signs; special issues of the dailies, and exhibits of telephone companies.

On Tuesday of the "week" there will be an electlunch at the Ad Club, with Ray Thomas as chairman of the day. R. H. Ballard of the Edison Company will speak, and John W. Mitchell will speak on "Electric Reminiscences." The Jovian Singers and Jovian Orchestra will furnish entertainment.

The regular weekly luncheon of the Jovian League on Wednesday will be an electric luncheon, all the viands being cooked on electric ranges before the people. This is also ladies' day, and the lunch will be followed by a card party for the ladies.

On Thursday there will be a meeting of the Rotary Club, the subject for discussion being "Electricity."

On Saturday it is planned to have an electrical parade, followed by an electrical dance at Ocean Park by invitation of the Chamber of Commerce of that city.

The local Electrical Prosperity Week Committee is working conjointly with the committee of the Jovian Electric, League and the plans will be considerably amplified the beginning of the week. The personnel of the combined committees is as follows: J. Harry Pieper, chairman, Southern California Edison Company; J. O. Case, secretary, General Electric Company; K. E. Van Kuran, Westinghouse Electric Company; T. E. Berger, Western Electric Company; J. C. Rendler, Southern California Electric Company; H. B. Woodill, Woodill-Hulse Electric Company; Carl E. Johnson, U. S. Electric Manufacturing Company; F. H. Tremble, Electric Lighting Supply Company; G. E. Arbogast, E. E. Newbery Electric Company; H. W. Harrison, General Vehicle Company, and J. E. Wilson. Max Loewenthal is campaign manager.

A SUGGESTED PROGRAM OF LEGISLATION RELATIVE TO CALIFORNIA GROUND WATERS.

BY CHARLES H. LEE,
Hydraulic Engineer.

Introduction.

The use of ground water sources for irrigation and domestic water supply is rapidly becoming an important element in the life and industry of California. Statistics presented in the United States Irrigation Census of 1910 show that the area irrigated by pumping from wells in 1909 was 277,000 acres, and the number of pumped wells was 9297, with a combined capacity of nearly 1000 cu. ft. per second. Since 1910 there has been a very rapid increase in irrigation pumping. From data published by the Irrigation Investigations Office of Experiment Stations, United States Department of Agriculture (Bulletin 1, Progress Report of Oo-operative Irrigation Investigations in California 1912-1914, State of California Dept. of Eng.), the number of pumping plants in 1914 was 24,589, or more than two and one-half times the number in 1909. Assuming that the area under irrigation from pumping plants has increased in the same proportion, the acreage in 1914 would be approximately 700,000. Most of the supply for this area has been developed since 1900. The present total area of land in California irrigated from all sources is approximately 3,200,000 acres. (See Bulletin 1 as above.) The area irrigated from ground water sources has therefore increased from a small percentage of the total irrigated in 1900 to approximately 22 per cent in 1914. Although accurate data are not at hand, it is yet undoubtedly true that a far greater percentage of ground water is used for domestic, manufacturing and general municipal purposes than for irrigation.

This extensive development of a natural resource, of which little was previously known, has brought new problems before the people of the state which touch the very life of many communities. These problems are being met with, in one phase or another, wherever the development of ground water is being undertaken, and involve not only the interests of the southern part of the state, but also of Central and Northern California. Fortunately the California courts have established principles regarding the percolating of underground water which, when applied, will conserve such waters and allow their widest possible use. There is as yet, however, no administrative body with authority to apply these rules wherever occasion demands, and the only present means by which they can be put into effect is through expensive litigation between the parties themselves.

This paper reviews in brief the physical situation relative to the ground water sources in California: the recognition of the physical situation by the courts and the need of state control and administration of ground water sources in connection with that of surface waters.

Underground Reservoirs.

The important ground water supplies of California are derived from porous and usually unconsolidated accumulations of gravel, sand and clay. These deposits overlie the impervious rock formation of the

earth's crust, and are found in most of our valleys and canyon bottoms, and along the shores of bays and the Pacific Ocean, where they form the coastal plains. The material composing these deposits had its origin in the adjacent hills and mountains, where the process of weathering breaks up the solid rock formations. The streams, flowing out on to the lowlands transport this rock debris and deposit it in the depressions or basins of the earth's surface. In this manner the valleys have been filled and the coastal plains built up. This work has been going on for centuries, and under favorable conditions immense quantities of material have accumulated.

The bodies of porous water-bearing materials are, in practically every case, surrounded by relatively non-porous formation. The latter is usualy represented by the encircling hills, whose slopes dip and meet beneath the valley floor, thus forming an enclosing basin or reservoir. In fact, the likeness is so complete that the terms "underground lake" or "underground reservoir" have come into quite common use, and have been generally used by the courts in decisions relating to underground waters in Southern California. These terms can be applied not alone to the high-encircled valleys, however, but in many instances to the coastal plain deposits, for these are quite commonly cut off from the sea by a ridge of impervious material so inconspicuous as to be overlooked by any but the trained observer. Even the water-bearing gravels along the east shore of San Francisco Bay, known as "cones," are "underground reservoirs," for they are merely the higher portions of the great body of alluvial material filling the bottom of the depression or valley now occupied by the bay.

The storage capacity of these underground reservoirs is composed of the void spaces between particles of gravel, sand and silt. This varies depending on the size of the particles and the percentage of different sizes lying together. Generally speaking, it varies from 20 to 35 per cent of the total volume. Water withdrawn from wells is extracted from these wells and the yield of a well is the amount of water it will continuously drain from the voids surrounding the well for a certain lowering of the water level in the well. The total supply available during any period of time, to all wells in a valley or "underground reservoir," is the volume of water in storage in the voids of the gravel deposit above the level from which the water can be economically pumped.

The attempt to pump this all out, however, would be the height of extravagant wastefulness, and would endanger the very life of the community. The purpose of a reservoir is to equalize inflow and outflow. The wise operation of a reservoir demands that a reserve be always kept on hand to provide for periods of drought. To accomplish this, the outflow must never exceed the average inflow less unavoidable reservoir losses. Wise development of underground reservoirs, therefore, must be guided by a knowledge of inflow and unavoidable reservoir losses.

The mystery which up until a few years ago shrouded the source, movement and final escape of ground water is being rapidly dissipated by the scientific investigations of the United States Geological Survey and other technical organizations, together with the occasional intensified studies made by hydraulic engineers in connection with local water supply investigations. The primary source of supply of underground reservoirs is now recognized as the rainfall upon the surface of the reservoir, and upon the surrounding tributary mountain watersheds. This water enters the gravels by percolation either directly from rainfall or from stream-flow and irrigation. The great quantity of water which stream channels or unlined irrigation ditches will absorb is so well known to hardly need comment. In passing, however, it may be stated that measurements by the United States Geological Survey on a number of Southern California streams indicate losses as great as 20 cu. ft. per second for every mile of channel. Also that on the larger irrigation projects of the San Joaquin Valley the seepage losses from the ditches and fields have caused additions to the ground water to such an extent that the level in some districts has risen to the extent of 50 ft.

The water thus absorbed sinks downward to the general water plane, and then moves materially toward the lowest part of the valley, where it escapes through natural outlets. Some of the escaping water appears as springs and seepages, which gather and join to form a living stream flowing from the drainage outlet of the valley. A very small amount may escape as underflow. In most cases by far the largest part is lost from evaporation from the moist soil and vegetation of the "cienaga," or swamp, which often exists in the lowest part of the valley. This process of evaporation is so difficult of detection by sight or sound as to hardly realize its importance. The extensive measurements of soil and grass evaporation made by the writer in Owens Valley, California, showed that the average depth of water lost from an area of 55 square miles of damp alkali-crusted soil and meadow land was 2 ft., and from a portion of the area exceeded 5 ft. In many of the underground reservoirs of Southern California more than 75 per cent of the unused supply is lost by evaporation from soil and plant surfaces, and even in Central California the loss is seldom less than 50 per cent.

For any reservoir, whether surface or subterranean, the relation of inflow to outflow is registered by the vertical movement of the water surface. Rising water-level indicates an excess in rate of supply and falling level a rate of outflow greater than inflow. Under natural conditions the adjustment of outflow to inflow for ground reservoirs is accomplished by the increase or shrinkage of the evaporating area and overflow into natural channels. Thus in the San Bernardino Valley, following a series of wet winters, there is always observed an expansion of the artesian area with its accompanying swampy condition and increased flow in Warm Creek and Santa Ana River, while the reverse is true after dry winters. Considering averages, however, inflow must equal outflow or there will be a persistent lowering of the ground water levels, shrinkage of evaporating area, reduction of artesian pressure and the drying up of springs and cienagas. Such a condition existed in Southern California during the ten years' dry period ending in 1904, and such a condition still continues in certain Southern California basins where the combined natural and artificial outflow exceeds the rate of inflow.

It is thus seen that the problem of determining the limit of the ground water supply is not one alone of observing fluctuating ground water levels, but must also be considered from the broader aspect of the relation of supply to demand. Recent progress in ground water investigations has shown that it is possible to determine with a certain degree of accuracy the actual quantity of inflow and outflow from underground reservoirs. The Los Angeles aqueduct has recently completed a series of measurements covering a period of three years, during which the inflow and outflow were measured, the two quantities agreeing to within 10 per cent. Although conditions are not always as ideal as in the Owens Valley, yet results can be obtained in most cases which would make intelligent regulation of ground water resorvoirs as possible and practical as for surface reservoirs.

In conclusion: There are two important features of ground water supplies which should be kept in mind. First, that the ground water supply is the common source from which all users of water within a definite area are drawing, and that the effect of withdrawal from each well or group of wells is felt to a greater or less degree in every other well within the area. Second, that the ground water supply is composed of an underground reservoir of definite extent, fed by percolation from definite bodies of surface water and finding its outlet by percolation or spring flow into surface stream channels, by evaporation from moist soil and vegetation near the ground water outlet, and, to a very limited extent, by underflow. Thus every user of subterranean water is vitally interested in all other developments of ground water, and also in the run-off from local rainfall, stream flow and the use of water for irrigation within an area covered by or tributary to the underground reservoir from which he draws.

Generally speaking, the need of legislation relative to ground water sources is to provide administrative machinery to put into practical effect the rules already laid down by the courts.

Surface and ground water supplies are so intimately related, physically, that one cannot be completely regulated and administered without similar control of the other. The logical time to adopt state control of underground water supplies is now, as they constitute the only remaining sources of water supply in many districts. In a number of instances it is also necessary to curb any unwise overdraft of water as well as avoid loss by evaporation. Developers need advice as to the probable yield in order to prevent waste of money. Artesian wells should also be capped to prevent waste. Furthermore, there is a great need for a systematic collection of and scientific study of data relative to ground water resources, both for the purpose of obtaining information of local conditions and for the ascertainment of broad principles. The gathering of such information requires knowledge of conditions over large areas and over extended periods of time, and it furthermore requires co-operation on the part of the local people, such as drillers of wells, water companies, etc. Such conditions can only be secured through a technical organization maintained by a disinterested party, such as a State or Federal Government.

Suggested Legislation.

The legislation which the writer believes will meet the needs and best fit into the legislation already accomplished, is as follows:

Revise and remodel the present law creating the State Water Commission, so as to remedy the evident defects and omissions, thus giving the officers of the Water Commission full opportunity to demonstrate the efficiency of such a body in dealing with surface water rights.

Second—When this has been accomplished and the commission has proven its worth to the people of the state, extend the provisions of the law so as to include the ground waters, following the rules so clearly defined by the courts already, but corroborating them as far as possible with the administrative principles already established for surface waters.

Third—In addition to its duties as an administrative body, the commission should be also authorized and provided with funds to maintain a permanent technical organization in charge of a competent hydraulic engineer, whose duties should include that of carrying on scientific investigations and studies of ground water supplies and their relations to surface waters, either independently or in co-operation with the United States Geological Survey. The commission would thus have at its command the machinery necessary for investigation of the difficult scientific and technical questions which arise in the determination of the source and amount of percolating ground waters. A further field for usefulness for such an engineering corps would be the issuing of public reports for the information of the people interested in the development of ground water resources.

The writer has merely attempted to present here in a preliminary manner his general ideas on the subject of ground water, leaving detailed discussion for a future paper. He earnestly hopes that the needed improvements in the present water commission law can be accomplished at an early date, thus paving the way for the needed ground water legislation.

The thermal conductivity of selenium, contrary to general opinion, is not changed by light. Experiments made with a 25-watt tungsten lamp, which was sufficient to increase the electrical conductivity nearly 300 per cent, showed no change in the rate of heat conduction.

The Rittman process of making benzol and touol from crude oil has proven a commercial success in the making of explosives. Gasoline can also be made as a by-product, laboratory experiments having shown a production of 58 per cent of gasoline from heavy asphalt base oil. This means about 25 gallons of gasoline per barrel of oil.

Wireless for railroads has been studied by Dr. F. H. Millener, of the Union Pacific Railroad, who recently presented an account of his investigations at the American Railway Electrical Engineers' convention. While the present high price of wireless apparatus prohibits its general use by railroads, this will adjust itself by a reduction in price when railroads decide to use it extensively.

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CONTENTS

Report on the Columbia River Power Project 405
By L. F. Harza.

Waterfall Electricity 408

The Application of the Rules of Business to the Science of Government 408
By A. B. Cass.

Power in Farming 409
By J. W. Swaren.

How to Perpetuate Electrical Prosperity 410
By C. E. Wiggin, H. F. Hartzell, A. H. Elliott, T. E. Burger.

Plans for Pacific Coast Participation in Electrical Prosperity Week 411

A Suggested Program of Legislation Relative to California Ground Waters 413
By Charles H Lee.

Thermal Conductivity of Selenium 415

The Rittman Process 415

Wireless for Railroads 415

Editorial 416
What is Prosperity?
Baby Bonds for Meters.
Recent Advances in Oil Burners.

Personals 418

Meeting Notices 418

News of California Railroad Commission 419

News of California Water Commission 419

New Catalogues 419

Publications Received 419

Industrial 420

News Notes 421

What is Prosperity?

Prosperity is to be the theme of every electrical man during the week to come. The great campaign of Electrical Prosperity Week will do much to make the people of the United States think that they are prosperous, and as a nation thinks, so it is.

The United States is prosperous today. Coffers are running over with gold, men are busy, and bumper crops have been harvested. Surely have we, as a nation, great cause for thanksgiving as to our material prosperity.

Yet prosperity is a relative term. What one man considers prosperity by another would be looked upon as bitter adversity. To specify a universal standard of prosperity seems impossible until we analyze the meaning of the word and get away from the dollar unit of measurement.

Prosperity originally meant "according to hope." A man is prosperous when he is advancing in the pursuit of anything desirable. Of the desirable things of life happiness seems to be the greatest. Mere money does not bring happiness. Happiness is characterized by contentment and a freedom from irksome cares. Happiness is a state of mind. That condition can never be instilled if the mind be filled with envy, hate and that self-pity we have for ourselves as being abused. By eliminating such thoughts, by getting rid of all discontent except that divine discontent known as ambition, we would have contentment, which is mental prosperity.

Those men who have arrived at that high state in which they can be content without wealth are prosperous. True success is not spelled "Su¢¢e$$," nor is true prosperity to be measured by the yard stick of material wealth.

Freedom from irksome cares, an essential ingredient of happiness, is being brought about through the medium of electricity more than through any other single labor. Electricity gives us the cheery light, lessens labor and brings comfort.

Truly then is this conjunction of electricity and prosperity an auspicious omen of happiness. By keeping these thoughts in mind, Electrical Prosperity Week will be lengthened into an electrical prosperity life, where riches and fame are but incidents to a state of progressive contentment.

Baby Bonds for Meters

Tradition has it that all the trouble of the world came into existence due to the curiosity of a woman, Pandora by name, who, having received a sealed box from one of the gods, with instructions never to open, proceeded forthwith to disobey the mandate, and to her dismay hatred, envy, jealousy, malice and countless other devils leaped out into the world.

As to whether the modern meter box is a lineal descendant of this far-famed gift of the gods history does not record, but we do know that the meter box has always—though oftentimes completely innocent—patent applications made their appearance at Washing-

been charged with practically every crime imaginable that could possibly be committed by a tyrrannical corporation in its efforts to rob a long-suffering people.

In recent years, by means of open and above board fair play in meter testing, by means of publicity campaigns, the accusation of flagrant inaccuracy of the registration of meters, has now practically been eradicated from the consumer's mind. But there still remains the meter deposit required of all consumers before service is connected. This seems to be a necessary protective precaution on the part of the public service corporation, and yet in face of the fact that most public service corporations now pay a reasonable rate of interest on this deposit, still in the minds of the consumer there is something that festers and rankles.

One well-known public service corporation has recently hit upon a plan which seems so reasonable and so sane in its demands that not only does the plan meet all the former protective requirements, so far as the utility company is concerned, but it actually creates a remarkable public interest and favorable sentiment on the part of the consumer.

The plan consists in issuing what are known as baby bonds, in valuations of five and ten dollars. These bonds, handsomely printed, bear the customary five per cent interest, and have coupons attached which are annually clipped by the consumer, and for which the consumer is either paid in cash or due credit put upon the monthly bill.

The baby bond has a distinct advantage to the company, in that it vastly simplifies the bookkeeping necessitated under the old system and tends to do away with much confusion in handling the entire matter.

On the other hand, the psychologic effect on the consumer is marked. It is most interesting to see how the public generally is pleased with this business like procedure. Even though the annual interest is but twenty-five cents, and even though many companies now pay interest on meter deposits, yet to the consumer that twenty-five cents, guarantedd by a bond with coupons attached, means the removal of a grouch that does as surely remain with him, whether justified or unjustified, as does the memory of the dime we sometimes loan to a friendly imposter, who takes advantage of friendship never to repay it. It's the maniest spirit of fair play back of the transaction, not the paltry money value involved.

Hence by this unique but straightforward procedure the time-honored curse is taken off the meter deposit system. The plan, now thoroughly tried out, is worthy the consideration of all utility companies.

Recent Advances in Oil Burners

In the early days of fuel oil operation in central station practice the burner or atomizer presented many perplexing difficulties. It was soon recognized as of utmost importance that the oil must be shot into the heated parts of the furnace in a gaseous or finely pulverized state, and that this must be thoroughly accomplished. Literally thousands of ton, all purporting to accomplish not only this feat in economic operation, but other allied and useful performances. It is needless to say that all save a handful have, during a decade of trying out, been relegated to the scrap heap.

Today three fundamental classifications in atomization design are found to exist. Of these the use of air as a means to be employed in atomizing the oil has proved of little application in central station practices, although in maritime practice it has received much prominence. Until quite recently steam diverted from the boiler under fire back into the furnace of the boiler has been perhaps the most popular and economic method. The main drawback to this method is the loss of from two to six per cent of the steam generated in the boiler. Not only is this a total loss in the steaming possibility of the boiler, but the injection of this steam into the furnace causes an appreciable absorption of furnace heat in further superheating this steam to the temperature of the outgoing gases and a consequent further loss in heat units.

The mechanical atomizer, the third and last type of fuel oil injector, was early recognized as the natural and most economic principle for burner design. Ten years of thought in applying practically every known law of mechanics to accomplish atomization by a mechanical process has at last begun to bear fruit. In the more recent and efficient types of mechanical atomizer the oil is preheated to a temperature of about one hundred and fifty degrees, and then forced under a pressure of some two hundred pounds through small grooves that pass inwardly toward the center of an aperture but slightly eccentric to it. This gives the oil a rotary motion, and under the high temperature and pressure it is forced to emerge in a thoroughly gasified state into the furnace.

To meet this recent advance in design the furnace arrangement, too, has undergone a change. Since the gasified fuel oil is shot into the furnace in a conical shaped spray, the air no longer can be efficiently fed from air ducts in the grate space below, but is drawn in from a cylindrical opening at the center of the cone, and thus finds complete and thorough mixture with the gasified oil for no means of escape is possible otherwise.

A number of the most prominent manufacturers of boilers and fuel oil specialties have had exhibits at the San Francisco Exposition during the year, in which these recent advances in fuel oil burner design are on display.

The great exposition has well been exploited as the greatest technical educator of modern times. The educational display of fuel oil apparatus and design, especially in burners and furnaces, is unquestionably the greatest gathering of this type of central station apparatus ever assembled under one building. Western men interested in economic study of fuel oil burnmay have indeed done well in emphasizing this feature of investigation in their visits at the exposition.

PERSONALS

F. Fagan of the General Electric Company spent a portion of the week at Sacramento on business of his company.

W. C. Wurfel, Pacific Coast manager Westinghouse Lamp Company, left for Chicago this week for a short business trip.

A. G. Wishon, general manager San Joaquin Light & Power Company, Fresno, Cal., was a visitor at San Francisco last week.

Lee Hendee, vice-president of the Line Material Company, of South Milwaukee, has just completed a business trip on the Pacific Coast.

Eugene Carpender, well-known central station man at Newton, Mass., was a recent visitor at the Panama-Pacific International Exposition.

W. B. Hall, representative of Pass & Seymour, San Francisco, returned the first of the week after a several weeks' trip through the Northwest.

A. B. Coriborn, assistant chief electrician of the Bradin Copper Company, of Chili, South America, is here visiting the United States on his vacation.

Bury I. Dasent has been appointed publicity agent of the British Columbia Electric Railway, Vancouver, B. C., to succeed Mr. Frank Harris, resigned.

S. K. Colby, assistant general sales manager of The Aluminum Company of America, with headquarters in New York, is a visitor at San Francisco.

C. E. Hardy, superintendent of the Department of Electricity for the city of Oakland, was married to Miss Isabel H. Prestro on the eighteenth of November.

H. T. Matthew, Pacific Coast representative of the Society for Electrical Development, spent a few days during the week at San Francisco, en route to Los Angeles.

R. H. Bowles, engineer for the Saopaulo Tramway, Light & Power Company, of Saopaulo, Brazil, has returned to South America after an extended visit in San Francisco.

H. H. Berry, engineer Pacific Light & Power Company, Los Angeles, has just returned from Washington, D. C., where he attended the conference of the Bureau of Standards.

Thos. Finigan, vice-president of Pierson, Roeding & Company, who has spent the past several weeks in the East visiting the factories represented by his company, has returned to San Francisco.

R. L. Eltringham, engineer Industrial Accident Commission, attended the Safety First Conference in Philadelphia, and is now in Washington, D. C., at the conference of the Bureau of Standards.

H. J. Dunn, vice-president Hunt, Mirk & Company, was severely injured in an automobile accident at San Diego last week, but is reported to be doing well. **Thos. Mirk** of the firm is at San Diego.

F. A. Richards, manager of the car department of Pierson, Roeding & Company, has returned to San Francisco from a visit to the factories of J. G. Brill Company, Philadelphia, and American Car Company, St. Louis.

W. G. Bee, vice-president Edison Storage Battery Company, has for the past two weeks been visiting the branch offices at Portland, Seattle and Spokane. He will return to San Francisco about December 2d.

William Knight, Honolulu manager of the Allis-Chalmers Company, has arrived at San Francisco on his return to the Islands. He has been visiting the Allis-Chalmers factories at East Norwood and Milwaukee for the past six weeks.

MEETING NOTICES.

Los Angeles Section, A. I. E. E.

A highly interesting paper, illustrated by numerous experiments and slides was delivered by A. O. Austin, ceramic engineer, before the Los Angeles Section of the A. I. E. E. at its meeting on November 16th. He proved conclusively that, while it was a custom formerly to increase the size of insulators, rather than to refine the parts, such is not the case today, when more effective use of materials is made. Failures of high tension insulators does not exceed one per cent, which is a splendid record, considering the severe conditions to which modern high tension insulators are subjected.

Electrical Development and Jovian League.

The regular weekly meeting was held Wednesday, November 17th, President G. C. Holberton presiding. The membership committee's report was accepted. Mr. C. C. Hillis, chairman of the league's Electrical Prosperity Committee, appointed the following committees in connection with the week's festivities: Messrs. T. W. Simpson, G. A. Koch and G. A. Sittman as committee on decorations at the Prosperity Ball; Messrs. A. E. Rowe, T. Collins, A. Morbio, S. V. Walton, C. W. Hutton and G. F. Wakeman, electrical parade committee. A. H. Halloran, campaign manager, told in detail of plans and arrangements under way for the due observance of Electrical Prosperity Week. The meeting was then turned over to Mr. S. Russell, chairman of the day, who introduced his speaker, Mr. Neil Neilsen. The latter gave a most interesting account of the trade affairs and governmental management of public utilities in Australia. The meeting closed with a vote of thanks to the chairman and speaker of the day.

Jovian Electrical League of Southern California.

Another snappy, well-attended luncheon of the League was held at Christopher's, Los Angeles, on November 17th, presided over by Tribune Holland, a splendid program having been provided by Harry Sessions, the very clever and popular chairman of the program committee. Even Harry Pieper's big brother of baseball fame came all the way from Boston to attend and Leo Youngworth pleaded for big brothers to enable come poor boys to join the Y. M. C. A. An invitation was extended to the League to attend the Long Beach celebration as guests of the chamber of commerce and the similar body from Ocean Park extended an invitation to an electric dance and carnival on the last evening of Prosperity Week. Committees were appointed by Tribune Holland to confer with the prospective hosts. Mr. Rawls of the baby selection committee reported that a little girl, three weeks young, called Annabelle, had been purchased for the $100 provided by Mr. Graves, a local banker. It was announced that an electrically-cooked luncheon would be served to the members and their ladies on December 1. The chairman of the day, Myron Wilbur Priseler, then introduced Miss Grace Cushman, who quite correctly imitated Sarah Bernhardt and Marie Dresler, besides rendering a number of comical songs, depicting certain private, quite private characteristics of several League members. The speaker of the day was Frank W. Blair, former prosecuting attorney for Illinois, who, in a jovial, and again in a serious vein related many reminiscences of important criminal cases, in which he played a part and drew from them most interesting psychological deductions.

Oregon Society of Engineers.

The regular monthly meeting and annual dinner of the Oregon Society of Engineers was held at the Portland Commercial Club at 6.30 p. m., November 18th. The dinner was served on the eighth floor of the club and several special entertainment features were given for the amusement of those present. The scene of these "special" features was laid in Prof. La Foilhouxs' private college. The speaker of the

evening was J. C. Ralston, consulting engineer and president of the technical engineering societies of Spokane, Wash. His subject was "The Broader Duty of the Engineer."

This paper urged upon the engineers the necessity of taking part in politics and other movements for the development of their city and state. He should be a leader, a man of affairs and a cultured gentlemen and have a message to deliver to humanity which will be for their elevation. The "conspiracy of silence" on the part of engineers, had caused them not to be chosen for public office. They are known as members of the "hermit" profession. An engineer should use engineering as a means to this end, but he must also have his profession or he will never attain distinction. From mythology, Mr. Ralston drew the following maxim for engineering conduct, "If one flies too low, the damp will clog your wings and if too high it will melt them." An engineer should cultivate public speaking and attain a pleasing address, in order to become a successful public servant. If lawyers and doctors are only 60 per cent successful with their cases they are considered, by the layman, as a credit to their profession and generally receive all manner of praise. If the engineer fails once he is for ever "damned." Consequently his efficiency must be 100 per cent.

It was announced by President Turner that the Association of Technical Societies of St. Louis, were considering disbanding as only 3 members were left. The Oregon Society of Engineers being one. At the next monthly meeting the point will be voted on by the Society.

The Oregon Society of Engineers has been invited to send a delegate to the Pan-American Scientific Congress, Washington, D. C., to be held in the first week in January. No action has been taken yet.

Mr. Samuel C. Lancaster spoke a few words on the Columbia River Highway. Attendance 70.

NEWS OF CALIFORNIA RAILROAD COMMISSION.

The commission has authorized the Western States Gas & Electric Company to withdraw from the Girard Trust Company, trustee, $86,947.64, to reimburse the company for plant betterments.

The commission has issued a supplemental order authorizing the Santa Barbara Gas & Electric Company, to issue $13,000 face value of its first mortgage 6 per cent thirty year gold bonds, to reimburse its treasury partially for plant expenditures.

The commission has issued a supplemental order authorizing the Pacific Gas & Electric Company to reimburse its treasury $1,447,500 from sale of certain bonds and stock, the money being used for plant expenditures, and to issue first preferred stock up to March 1, 1917, instead of to November 1, 1915.

The Southern Counties Gas Company has filed with the commission an application for approval of the company's depositing $15,500 bonds with the Los Angeles Trust & Savings Bank for sinking fund purposes in lieu of cash.

The commission has issued an order authorizing the San Diego and Arizona Railway Company to issue promissory notes for $75,000, due one day after date, to Anglo and London Paris National Bank.

NEWS OF CALIFORNIA WATER COMMISSION.

The State Water Commission is kept busy with the many applications submitted to it for the appropriation of water from the various sources in the state. Of interest to this section in general is the permit just granted by the commission to J. W. Squires and R. B. Gilmour of Stockton to use 160 miner's inches, or four cubic feet, of water from Littlejohn Creek, which has its rise in the foothill region of Calaveras and San Joaquin Counties, and empties into the San Joaquin River through the French Camp Slough, south of Stockton. The permit was granted for the purpose of irrigating 142 acres of farming lands. The water is to be diverted at a point 60 ft. west of 1850 ft. north of the southwest corner of Sec. 35, T. 1 N., R. 7 E., M. D. M. The creek is to be dammed with lumber and earth, dam 5 ft. high, 35 ft. on top and 20 ft. on bottom, and the main ditch is to be three-eighths of a mile long. Littlejohn Creek carries storm waters and is available for irrigation only a portion of the year. No protests were filed against the use of the water from this source. The permit does not guarantee the supply, and was granted by the water commission subject to the rights before existing on the stream.

The commission has just granted to L. J. Stone of Waddington, Humboldt County, a permit to use three miner's inches from Soldiers Grove Spring, in the Van Duzen watershed in that county, for gold mining purposes. The point from where the water is diverted is in the S.W. ¼ of the N.E. ¼ of Sec. 14, T. 2 N., R. 4 E., Humboldt Meridian. A three-inch pipe is to be run 3500 ft. to carry the water for use at quartz mill and camp.

Samuel W. Gandreau has just been granted a permit by the commission to use 20 miner's inches, or one-half a cubic foot, of water from four springs in San Bernardino County, for irrigation and domestic purposes. The water is to be applied on a homestead in Sec. 5, T. 1 N., R. 5 W., San Bernardino Base and Meridian. The amount of land to be irrigated is 29 acres.

NEW CATALOGUES.

Reynolds Electric Company of Chicago have just issued Bulletin No. 33 on Reco flashers, color hoods and motors.

"The Richardson Model 'M' Sight Feed Oil Pump" contains much new information concerning the well-known Model "M" Lubricator.

Bulletins Nos. 50 and 60, "The Phenix Force Feed Lubricator," recently issued by the Richardson-Phenix Company of Milwaukee, Wis., contains a complete description of the Phenix ratchet type lubricator; it also describes a new type, known as the Model "T." The catalog contains an interesting diagram, giving a comparison of the way in which mechanical and hydrostatic lubricators feed oil to engine cylinders.

"The Triangle" is the name of a publication issued by the Westinghouse Agent-Jobbers Association, East Pittsburgh, Pa. The October issue, which has just made its appearance, has an attractive cover showing Niagara Falls, in honor of the recent meeting of the jobbers held at that point. The magazine contains a number of articles with reference to the sale of electrical products and is well illustrated throughout with views of interest to the electrical profession.

PUBLICATIONS RECEIVED.

Bulletin 98, from the U. S. Bureau of Mines, "Report of the Selby Smelter Commission," by J. A. Holmes, E. C. Franklin and R. A. Gould, describes in detail the methods used, some of them new, in determining the contamination of the air and the damage to trees, crops, and live stock by the smoke and fume from the Selby Smelter, in California, and gives the conclusions of the commission on the methods used by the smelter company to prevent injury. The bulletin is of especial interest to metallurgical companies, municipal or state boards of health, and persons investigating damage by smelter smoke. The volume contains 528 pp. and may be obtained for $1.25 from the Superintendent of Documents, Government Printing Office, Washington, D. C.

INDUSTRIAL

AN ELECTRIC RANGE CAMPAIGN THAT PAID.

An interesting as well as profitable electric range campaign is reported by the Western Electric News as having been conducted by one of their agents, the Iowa Railway & Light Company of Toledo, Iowa. The company, with power lines extending through several of the smaller Iowa cities, decided to put more heating devices on their lines to maintain a day load. The electric range was used as a means to this end.

A campaign was mapped out with three days at Tame, three days at Toledo, and two days at Gladbrook—all in Iowa. Previous to the campaign a systematic series of ads. serving to stimulate an interest in electric ranges, were run in the daily papers of the above towns. A few days prior to the actual opening of the campaign, slides pertaining to it were run in the moving picture houses and a special personal letter was sent to each of the company's customers in the various towns.

The actual campaign was the culmination of the preparatory advertising; the people were given an opportunity to see in operation the electric stove they heard so much of in print. Practical demonstrations were held in each town in which the electric stove was made to bake bread and cakes, broil steak and chops and prepare entire meals. These demonstrations were almost continuous and were held where everybody could see them. Not only did the people see that the stoves were practical but they were shown the amount of current used for each operation, proving their economy under existing rates. The school boards of the towns received special invitations to visit these demonstrations and as a result, two complete domestic science equipments were sold.

The campaign was a success not only from the standpoint of stoves actually sold but from an educational angle. Those people who did not buy electrical devices during the campaign have an idea as a result of it that electrical devices are worth while, and people with that idea are decidedly good sales prospects. When the Iowa Railway & Light Company conducts its next campaign they will find that the actual sales will show an increase because they will cash in on the desire for electrical devices they have created as a result of their first campaign.

BOOK REVIEW.

"Principles of Direct Current Machines." By Alexander S. Langsdorff; 393 pp., 6x9 in.; 313 fig. Published by McGraw-Hill Book Company, New York City, and for sale by Technical Book Shop, San Francisco. Price, $3.00

Seldom has an author mixed so much good theory with practice as is found in this volume. For the student and for the designer this text lays down the fundamental principles with mathematical precision and literary prevision. The book is divided into eleven chapters. After an introductory chapter on general laws and definitions, the dynamo is fully discussed as to its several types, with particular attention to armature windings the magnetization curve, armature reaction and operating characteristics of generators. The chapters on motors discuss the several types of apparatus and control, together with efficiency, rating and heating. Special stress is laid on the theory and practice of commutation, this one section making the book valuable to designers. The concluding chapter discusses boosters, balances and train lighting systems. Throughout the book great emphasis has been placed upon the physical meaning of facts expressed mathematically, so that the book is well adapted for the use of students familiar with the higher mathematics.

NEW SEWING MACHINE MOTOR.

A new type of motor for the Wilcox & Gibbs domestic sewing machines is being shown in operation at the New York Electrical Show in the Westinghouse Electric & Manufacturing Company's booth. The motor is smaller than those previously used and is coupled directly to the machine shaft without use of belts, brakes or friction drive. The speed of the motor and hence of the needle is under perfect control by the operator from a special foot pedal supplied with the motor. In this pedal there is a specially constructed resistance which has virtually an unlimited number of steps similar in principle to a slide wire resistance. This gives perfect speed control from zero up to 1800 stitches per minute. However, as this speed is higher than practicable an adjustable stop is provided so that the operator may easily adjust the maximum speed to suit her own taste. Any speed from the maximum to one stitch at a time may be obtained.

The acceleration is always smooth regardless of what speed is desired, there is no jerking, no breaking of threads.

No brake is necessary because the motor very quickly comes to rest since the large flywheel required with foot power is not included in the drive. The motor is of the compensated universal type permitting it to be used on any 110-volt circuit whether ti be 25, 60 or 133 cycles.

NAVAL MEN WITNESS TEST ON NEW METHOD OF REFRIGERATION.

A number of prominent naval and shipbuilding officials were present at East Pittsburg, Friday, October 29th, to witness a test of a new refrigerating machine manufactured by the Westinghouse Machine Company.

The machine was invented by Maurice Le Blanc, the originator of the well-known Le Blanc condenser, and is being marketed in the United States and Canada by the Westinghouse Machine Company.

A particular feature of the machine is the absence of all chemicals or compressed gases as carbon dioxide, ammonia, or sulphur dioxide, such as are generally used in connection with refrigeration. This point will readily be appreciated when the present scarcity of chemicals due to the present war is recalled.

The test was entirely satisfactory and those present expressed much interest in the results obtained.

TRADE NOTES.

The Allis-Chalmers Company have just commenced the electrification of the Pioneer Mill Company on the Island of Mauai, Hawaiian Islands, which consists of a high pressure steam turbine. Power will be used eight months of the year for refining sugar and the other four months for irrigating.

The Westinghouse Electric & Manufacturing Company has obtained a large order for electrical apparatus to be used to equip the new plant of the Oregon Portland Cement Company at Oswego, Oregon. The price for the equipment was over twenty thousand dollars. The order was placed through the Portland office.

The Commonwealth Edison Company of Chicago, Ill., has recently awarded to Westinghouse Electric & Manufacturing Company an order for a 30,000 kw., 60 cycle, turbo-generator unit, composed of a single generator rated 35,300 k.v.a., at 85 per cent power factor or 30,000 kw., and a tandem compound type steam turbine. It is, therefore, the largest unit which has been undertaken by any manufacturer up to the present time.

NEWS NOTES

FINANCIAL.

SAN FRANCISCO, CAL.—Articles of incorporation of the Great Western Power Company of California have been filed by Attorney Guy C. Earl. This action, according to Mortimer Fleishhacker, president of the existing Great Western Power Company, is the first step in a new financial plan whereby the old company and its subsidiaries, which include the City Electric Company and the California Electric Generating Company, will be amalgamated. The capital stock of the new company is $60,000,000, divided into 600,000 shares of a par value of $100 each. Of this number 300,000 are preferred shares and 300,000 common. Incorporation is for a 50-year term. San Francisco is named as the principal place of business. The incorporators are: Mortimer Fleishhacker, Washington Dodge, James Irvine, P. W. Ham, W. F. Eccles, E. Mackennall and William Forrest, all of San Francisco; Guy C. Earl, W. H. Spaulding, and Chaffee E. Hall of Oakland; H. A. Cooke of Easton, L. A. Reynolds of Alameda, and J. A. Koontz of Palo Alto.

ILLUMINATION.

CORONADO, CAL.—The city council has ordered lights put in on Eighth street from F to K avenues.

CALEXICO, CAL.—A contract has been signed with the Holton Power Company for a new street lighting system for Calexico.

PASADENA, CAL.—The city commission awarded a contract for street lighting on Colorado street to the F. O. Engstrom Company for $4844.

REDDING, CAL.—The board of trustees has received an estimate that an entire lighting system of first class material could be installed at a cost of $6500.

SPOKANE, WASH.—An ornamental curb lighting system for Bain avenue from Monroe to Washington streets is being considered by property owners along that street.

TRACY, CAL.—The board of trustees has sold a 25 year franchise to Mr. Beale for a gas plant. It is understood work will be started soon upon the erection of the plant.

EUGENE, ORE.—The common council is considering an ordinance providing for the construction and installation of an ornamental street lighting system at a cost of about $1920.

SPOKANE, WASH.—The Trent avenue lighting system consisting of luminous arc curb lights on the south side of the avenue from Division to Lincoln has been approved by the city council.

PASADENA, CAL.—The city commission has adopted a resolution of intention ordering the construction of posts, conduits, wires, etc., for lighting Prospect Boulevard, Prospect Terrace and Prospect Square.

CORONA, CAL.—The city trustees are considering the possible piping of natural gas to Corona from the Fullerton fields, joining the movement with Riverside, San Bernardino, Redlands and other valley towns.

PHOENIX, ARIZ.—The city commission has authorized the city manager to award a contract for furnishing not to exceed 294 ornamental light standards, to Geo. R. Williscroft at the contract price of $22.75 per standard.

ABERDEEN, WASH.—The Elma Light & Power Company has made application for a franchise to construct a line for the transmission of electric current for light, power and heat. December 6th has been set as the date of hearing.

SANTA ANA, CAL.—The Southern Counties Gas Company is making a strong bid for the use of natural gas in lighting the streets of this city. The company has offered to furnish gas and maintain lights for $9.95 per year per light.

SAN DIEGO, CAL.—A lighting contract providing for the expenditure of $2028 in five years' time for lighting of a portion of Kensington Park has been awarded to the San Diego Consolidated Gas & Electric Company by the county board of supervisors.

SAN BERNARDINO, CAL.—Citizens and business men of E and Fourth streets, have inaugurated a movement for the installation of ornamental lights on E street, from Third to Fifth street and on Fourth street from D to F streets. It is proposed to bring the matter to the attention of the city council.

HUNTINGTON BEACH, CAL.—The city trustees have passed a resolution expressing intention to call an election for the purpose of bonding the city in the sum of $20,000 for a municipal gas plant. In case the bonds carry the city is to take over the present distributing system, make needed extensions and buy natural gas from the Southern Counties Gas Company.

TRANSMISSION.

TACOMA, WASH.—The council voted to permit the town of Alder to take electric current from the power plant at La Grande, provided the town builds its transmission line.

INDEPENDENCE, ORE.—The Oregon Power Company plans to extend its system south of this city to Buena Vista and give electric service to that village. A. L. Martin, manager.

OREGON CITY, ORE.—The county court has granted the Portland Railway, Light & Power Company a franchise to erect poles and string wires along the county roads near the town of Monitor.

TACOMA, WASH.—The county commissioners have granted a franchise to the Puget Sound Traction, Light & Power Company to build power lines in the upper Puyallup valley, using the county roads.

WALLA WALLA, WASH.—The board of county commissioners has taken under advisement the application of the Pacific Power & Light Company for a power line franchise along the road between Prescott and Waitsburg.

SEATTLE, WASH.—The council passed an ordinance appropriating $25,000 to be expended by the board of public works in experimenting in silting or otherwise sealing Cedar River impounding basin, over the veto of the mayor.

WALLA WALLA, WASH.—The board of county commissioners have under advisement its decision on the application of the Pacific Power & Light Company for a power line franchise along the county road between Prescott and Waitsburg.

LOS ANGELES, CAL.—The public service commission has authorized Architect F. L. Roehrib to draw detailed plans and specifications for the central power sub-station to be erected in this city at a cost of about $50,000. This sub-station will receive the electrical energy from the aqueduct power plants and will be the main depot in the city for distribution.

BYRON, CAL.—The Byron-Bethany Irrigation Company has awarded a contract for furnishing power to the Sierra & San Francisco Power Company. The Sierra people plan extensive improvements in their service in the Byron-Brentwood-Bethany District. A substation will be built near Byron.

LAS VEGAS, NEV.—The Consolidated Power & Telephone Company has made a contract to furnish electric current. The only delay in instituting the new service will be the necessity of installing large transformers to handle the current. The present plant will be kept in reserve as an emergency plant.

GRANTS PASS, ORE.—W. B. Sherman has been granted permission by the state engineer to appropriate 1000 second feet of waters of Rogue River at Hell Gate for the development of an irrigation and power project costing $200,000. The project calls for the construction of a dam 22 feet high, 350 ft. long at the top and 100 ft. long at the bottom, which will develop 2500 h.p. for light and power.

TACOMA, WASH.—With assurance from General Manager Bean of the Tacoma Railroad & Power Company that a franchise for the extension of the Pacific avenue line probably would be asked in 30 days, the council voted to accept a schedule by which the city will connect up the Stone-Webster power plant, insuring an auxiliary supply for the city's Nisqually power system. Mr. Bean stated that this work will be taken up by spring.

TRANSPORTATION.

EAST SAN DIEGO, CAL.—The San Diego Electric Railway Company has agreed to extend its No. 2 car line eastward on University avenue to Euclid in East San Diego. A franchise will be applied for.

LOS ANGELES, CAL.—The City Railway Company has been granted a 21-year franchise to construct and operate a double track electric street railroad beginning at the northerly line of Thirtieth street at San Pedro street to Jefferson street, on South Park avenue, etc.

TELEPHONE AND TELEGRAPH.

TOMBSTONE, ARIZ.—Deputy U. S. Mineral Surveyor J. A. Rockfeller and son have completed a survey of a new telephone line to be built from Benson to Fairbank.

WASHTUCNA, WASH.—Emmett Hubbs of Ralston, president of the Washtucna High Line Telephone Company, has announced that the company is planning some changes in its line at Washtucna.

IDAHO CITY, IDAHO.—The Intermountain Railroad Company has let a contract to James Campbell and Archie Koppes of Centerville for the construction of its telephone line from the station to Grimes Pass.

NAMPA, IDAHO.—Construction work will begin immediately on a new telephone line from Nampa to Kuna. The work will involve the stringing of 200 miles of wire and setting of about 5 miles of poles.

COLTON, CAL.—Application has been made to the board of trustees for a franchise to construct telephone and telegraph wires in Colton and sealed bids will be received for the franchise up to December 7th.

HOLLISTER, CAL.—A franchise to use the county road for a telephone line five miles long from Cottage Corner, around through south Ausaymas district, has been granted N. Ausaymas. The contract for the installation has been let to Paul Bullock.

VALLEJO, CAL.—Estimates are to be secured at once on the cost of running a telephone line to Wild Horse Valley, The telephone company will be asked its price for running a line along the poles of the Great Western Power Company, over which this city has right of way from Napa to the city's property.

NEWMAN, CAL.—At a meeting of the stockholders of the Gustine-Newman rural telephone lines at Gustine for the consideration of some method of improving the service, It was practically decided to incorporate a regular stock company. P. J. Giovannoni was elected president. It is estimated that $10,000 or $12,000 will be required to put the lines in order.

LOS ANGELES, CAL.—That the city council should decide without delay whether it is the intention to renew the franchise of the Sunset Telephone Company, which will expire next year, will be suggested to the council in a few days by City Attorney Stephens. It is understood that Stephens will recommend that an ordinance be drafted renewing the company's franchise with the provision that interchange telephone service must be provided.

REDDING, CAL.—The Pacific Telephone & Telegraph Company is spending $77,410 on improvements, between Red Bluff and the Oregon line. The company will expend $34,450 in rebuilding and rerouting 14½ miles of the main lead between Antler and Lamoine, and between Sims and Catela, replacing 172 pound copper circuit from Antler to Dunsmuir with No. 10 copper, and also replacing 340 defective poles on sections not rerouted. Improvements are necessary in order to avoid interference from highway construction and to place the lead in a condition to withstand the winter snows and sleet storms. It is expected the work will be finished in about 60 days.

WATERWORKS.

COUNCIL, IDAHO.—The contract for the new waterworks system has been let by the village trustees to E. L. Phelps of Weiser for $11,200. Preliminary work is already started.

SANTA MONICA, CAL.—The date of the municipal water bond election has been set for December 21st. It is proposed that the city shall issue $712,000 in bonds for the purchase of the systems of four Santa Monica water companies and their connection into a municipal plant.

SEATTLE, WASH.—The Natatorium Company has applied to the city council for a franchise to construct and maintain a 6-inch salt water main from Elliott Bay to Second street. The franchise is for 50 years. The council will probably ask for the installation of hydrants.

LOS ANGELES, CAL.—A petition has been filed with the city clerk by property owners in the Mission district of San Fernando Valley, requesting the city council to call a bond election for the purpose of voting bonds to pay for a distributing system to supply the valley with aqueduct water.

LOS ANGELES, CAL.—A petition of votors of Hollywood has been filed with the city clerk requesting the city council to call an election in that district to decide whether or not they shall vote bonds amounting to $1,000,000 to use in purchasing the Union Hollywood Water Company and to provide for the extension of the service.

NEWPORT, CAL.—The board of trustees has rejected all bids received for the four-inch water pipe to be used in extending fire protection for East Newport, and the necessary piping will be purchased by a committee consisting of Water Superintendent John McMillan, Trustees S. R. Jumper and George P. Wilson. There will be 5500 ft. of 4-in. piping and 27 fire plugs installed at East Newport and the Goudge Tract. The cost will be about $3000.

OAKLAND, CAL.—A board of 13 directors has been nominated by the five committees interested in the reorganization of the People's Water Company, which is approved by the various factions, and which will represent all of the interests concerned. The members include: Robert M. Fitzgerald, John S. Drum, J. Y. Eccleston, Percy T. Morgan, F. W. Van Sicklen, Henry E. Bothin, P. E. Bowles, J. F. Carlston, George B. Collins, E. A. Heron, Frank Otis, William Cavalier and Stuart Hawley. Of these, Heron and Cavalier are the personal representatives of Frank C. Haven. According to the plan the directors will hold office for five years, and in case of a resignation or death a new director will be elected by a ballot of the board.

BEND, ORE.—A pure water supply for the city of Bend, with better pressure for fire protection, is assured as a result of the action of the city council. Under the plan recommended by the council and agreed to by the Bend Water, Light & Power Company the company will extend its pipe lines up the river to the Central Oregon flume at a point where the natural reservoir is formed. The water will flow from there to the present reservoirs in the city.